

Appl. No.: 09/448,175  
 Amdt. dated 7/25/2005  
 Reply to Office Action of February 23, 2005

**Amendments to the Claims:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims**

Claim 1 (Currently Amended). A frequency analyzer for analyzing a plurality of input signals  $x_0(m) \dots x_r(m) \dots x_{M-1}(m)$ , the frequency analyzer comprising:

a plurality of input modulators for modulating and shifting said input signals  $x_0(m) \dots x_r(m) \dots x_{M-1}(m)$ , defining shifted output signals, wherein said plurality of input modulators include a multiplier for multiplying each of said input signals  $x_0(m) \dots x_r(m) \dots x_{M-1}(m)$  by a factor  $(-1)^m e^{-j\omega n}$ , where  $m$  is a time index;

a polyphase filter network which includes a plurality of polyphase filters  $p_0(m) \dots p_p(m) \dots p_{M-1}(m)$ , each having a coefficient for receiving said shifted output signals and defining polyphase filter output signals; and

a plurality of output modulators for modulating the output of said polyphase filters, said frequency analyzer configured to synthesize said plurality of input signals  $x_0(m) \dots x_r(m) \dots x_{M-1}(m)$  wherein each of said plurality of polyphase filters includes a network coefficient and said output modulators include a multiplier for multiplying the output of each of said polyphase filters by a predetermined factor selected so that said coefficients are real.

Claim 2 (Canceled).

Claim 3 (Previously Amended). The frequency analyzer as recited in claim 1, wherein said output modulator includes means for multiplying said polyphase filter output signals by a factor  $e^{-j2\pi k_0 p/M}$ , where  $k_0$  is a suitable odd/even stacking factor and  $p$  is the channel, and  $M$  is total number of channels.

Claim 4 (Currently Amended). A polyphase filter comprising:  
 a plurality of filter channels,

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$$\overline{p_0(m)} \dots \overline{p_p(m)} \dots \overline{p_{M-1}(m)}$$

for filtering a plurality of input signals  $x_0(m) \dots x_p(m) \dots x_{M-1}(m)$ , each of said; and  
 a complex modulator, which modulates each input signal  $x_0(m) \dots x_p(m) \dots x_{M-1}(m)$  by a factor  $(-1)^m$ , where  $m$  is the time index; and

a plurality of output modulators for modulating each of the outputs of said plurality filter channels by a modulation factor, wherein each of said input signals are modulated by a complex modulator which modulates each input signal  $x_0(m) \dots x_p(m) \dots x_{M-1}(m)$  by a factor  $(-1)^m$ , where  $m$  is the time index and wherein each of said plurality of filter channels includes a coefficient and said output modulators include a multiplier for multiplying the output of each of said filter channels by a factor selected so that said coefficients are real.

Claim 5 (Original). The polyphase filter as recited in claim 4, wherein said complex modulation factor is  $e^{-j2\pi k_0 p/M}$ , where  $k_0$  is a selectable odd/even stacking factor,  $p$  is the channel and  $M$  is the number of channels.

Claim 6 (Withdrawn). A complex modulator for generating a signal  $(-1)^m$ , where  $m$  is a time index, the modulator comprising:

a multiplexer adapted to receive an input signal IN at one input and an inverted input at another input;

an AND gate having at least two inputs and an output, said output for controlling said multiplexer and

a divider for dividing a clock signal by two defining a divided signal, said divided signal applied to one input of said AND gate;

wherein said AND gate is adapted to receive an odd/even stacking factor  $k_0$  at the other of said inputs of said AND gate.

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Claim 7 (Previously Amended). The frequency analyzer as recited in claim 1, wherein said input modulators include an inverter and one more multiplexers for receiving one or more compensation vectors for selectively negating said input signals.

Claim 8 (Previously Amended). A frequency combiner for combining a plurality of input signals  $x_0(m) \dots x_r(m) \dots x_{M-1}(m)$ , the frequency combiner comprising:

a plurality of input modulators for modulating and shifting said input signals  $x_0(m) \dots x_r(m) \dots x_{M-1}(m)$ , defining shifted output signals;

a polyphase filter network which includes a plurality of polyphase filters  $p_0(m) \dots p_p(m) \dots p_{M-1}(m)$  each having a coefficient for receiving said shifted output signals and defining polyphase filter output signals; and

a plurality of output modulators for modulating the output of said polyphase filters, said frequency analyzer configured to combine said plurality of input signals  $x_0(m) \dots x_r(m) \dots x_{M-1}(m)$  and provide a single output signal  $x_r$ , said output modulators include a multiplier for multiplying the output of each of said plurality of polyphase filters  $p_0(m) \dots p_p(m) \dots p_m(m)$  by a predetermined factor selected so that said coefficients are real.

Claim 9 (Previously Amended). The frequency combiner as recited in claim 8, wherein said input modulators include an inverter and a one more multiplexers for receiving one or more compensation vectors for selectively negating said input signals.